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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.           | CONFIRMATION NO. |
|--|-------------|----------------------|-------------------------------|------------------|
| 10/534,179   | 05/05/2005  | Dirk Jacob Ligthelm  | TS6248 US                     | 9964             |
| 23632  | 7590        | 11/01/2006           |                               |                  |
| SHELL OIL COMPANY<br>P O BOX 2463<br>HOUSTON, TX 772522463 |             |                      |                               |                  |
|  |             |                      | EXAMINER<br>DITRANI, ANGELA M |                  |
|  |             |                      | ART UNIT<br>3676              | PAPER NUMBER     |

DATE MAILED: 11/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/534,179

Applicant(s)

LIGTHELM, DIRK JACOB

Examiner

Angela M. DiTrani

Art Unit

3676

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 May 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>05/05/05, 08/02/06</u> . | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because the notation and arrows used to specify components are not clear. For example, it is difficult to distinguish between the water (denoted as ~) and the oil (denoted as -) in the permeable layers of Figure 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

2. The disclosure is objected to because of the following informalities:

On page 4, lines 13-16, applicant is advised to rearrange the statement to - -  
Normally, the driving fluid (first fluid) comprising the first compound will have a  
higher mobility in the highly permeable geological layer than formation fluid  
produced from the adjacent oil-bearing geological layers - - in order to correct the  
statement as previously written.

On page 6, lines 2-3, applicant is advised to remove "according to any one of the  
preceding claims."

On page 6, line 17, the order of "interposed three" should be rearranged to  
- - three interposed - -.

On page 6, line 25, the term "water" following the closing parenthesis should be  
removed since it is a repeat of the term preceding the opening parenthesis.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly  
claiming the subject matter which the applicant regards as his invention.

4. Claims 5 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being  
indefinite for failing to particularly point out and distinctly claim the subject matter which  
applicant regards as the invention.

5. Regarding claims 5 and 10, the phrase "such as" renders the claims indefinite  
because it is unclear whether the limitations following the phrase are part of the claimed  
invention. See MPEP § 2173.05(d).

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-3, 7-8, and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by BOSTON (US 3285338).

8. With respect to claim 1, BOSTON discloses a method for selectively reducing the permeability of one or more relatively permeable geological layers of an oil-bearing formation to inhibit breakthrough of driving fluid from a driving fluid injection well via at least one of said layers into an oil production well, which method comprises the steps of:

- injecting a driving fluid comprising a first compound into the formation via the injection well; {see column 1, line 71-column 2, line 8}
- detecting the first compound in well fluid of the oil production well; {see column 2, lines 8-12}
- upon detection, injecting a second compound into the formation via the oil production well, to react with the first compound in order to provide a flow restriction generated by a third compound which comprises a reaction product of the first and second compounds in at least one relatively permeable geological layer through which breakthrough of the driving fluid into the oil production well has occurred {see column 2, lines 12-16 and column 3, lines 58-65}.

With respect to claim 2, the reference teaches the second fluid with a mobility intermediate, as claimed {see column 3, lines 70-75}.

With respect to claim 3, the reference teaches the first compound that is inert relative to the compound present in the formation, as claimed {see column 2, lines 4-7}.

With respect to claim 7, the reference teaches the oil-bearing formation as claimed {column 2, lines 37-44}.

With respect to claim 8, BOSTON discloses a kit of compounds comprising a first compound for injection into a subsurface formation via an injection well which first compound can pass through the formation concurrently with a driving fluid, and a second compound for injection into the formation via a production well, which second compound can react with the first compound so as to form a reaction product in the formation which imposes a flow restriction {see column 1, line 71 – column 2, line 16 and column 3, lines 58-65}.

With respect to claim 12, the reference teaches the method wherein a spacer fluid is not injected into the production well between detection of the first compound and injection of the second compound {see column 4, lines 22-24}.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 4-5 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over BOSTON in view of SANDIFORD (US 4,147,211).

BOSTON discloses the method as stated above. However, the reference fails to teach the first compound comprising an alkaline material and the second compound comprising iron chloride.

SANDIFORD teaches a method of treating a plurality of wells involved in an enhanced oil recovery process with a solution that sets with time to form a plug in one or more permeable zones of the reservoir surrounding each well for the purpose of reducing the permeability and providing at least a partial barrier to the flow of fluids through the pores of the reservoir if not a complete plug through which no fluids can flow {see abstract and column 3, line 45 - column 4, line 10}. The plug-forming composition can be injected as two separate reactive compositions that contact and mix in the reservoir. SANDIFORD teaches several water-soluble polymers for use, including polyacrylamides and partially hydrolyzed polyacrylamides {see column 4, line 39 - column 5, line 37}. The material that reacts with the polymer includes a cross-linking agent capable of forming a gelatinous precipitate and can include multivalent metals and reducing agents, such as ferrous chloride {see column 7, line 28 – column 8, line 56}.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the method of selectively reducing the permeability of one or more relatively permeable geological layers of an oil-bearing formation disclosed by BOSTON while choosing a first and second compound wherein

the second compound further comprises an additional component in view of SANDIFORD in order to enhance the oil recovery process as disclosed by BOSTON.

11. Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over BOSTON in view of JOHNSTON (US 3,958,638).

BOSTON discloses the method as stated above. However, the reference fails to teach the encapsulation of the first compound.

JOHNSTON teaches a method for altering the permeability of a subterranean formation in which the porosity of the formation is altered by using a polymer solution that has at least one encapsulated gelation agent incorporated therein for the purpose of providing fluid control in a subterranean formation in which gelation occurs in situ as well as a method for transporting the agent to a desired site within the formation {see column 1, lines 6–45 and column 2, lines 13-26}.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the method of selectively reducing the permeability of one or more relatively permeable geological layers of an oil-bearing formation disclosed by BOSTON and provided for encapsulation of the first compound injected in the injection well in order to provide a more efficient method for the first compound to be transported to the desired site of the oil production well.

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:



US 2,786,530 MALY teaches a method for creating impermeable plugs in high permeability strata of a subterranean formation that are not readily bypassed by driving fluids. A heavy metal salt or soap may be used as the first liquid that is pumped into the intake well which then reacts with an aqueous solution of an iron or aluminum salt that is subsequently injected into the producing well to form an impermeable solid {see column 2, lines 38-49 and column 3, line 75-column 4, line 12}.

US 3,396,790 EATON teaches a method of selectively plugging the more permeable water channels of a subterranean formation using a water soluble reactant combination of sodium carbonate and ferric chloride for the purpose of forming a solid precipitate on contact under formation conditions {see column 3, lines 50-75 and column 6, lines 28-36}.

US 3,386,509 FRONING teaches a method of plugging a highly permeable zone by injecting a settable liquid that is displaced into the zone into the first well and then forming a strong plug in the zone by injecting an activator into the second well {see disclosure}.

US 4,903,767 SHU et al. teaches a method of treating a reservoir that has been flooded with a carbon dioxide containing substance by injecting a polymer and resin into an injection or production well in order to selectively plug high permeability zones while causing little or no damage to lower permeability oil-rich strata {see column 4, lines 40-61}.

US 4,915,170 HOSKIN teaches a method of plugging the regions of a high permeability zone to divert the drive fluid into regions of lower permeability by

introducing a first gel-forming composition in a non-gelatinous state and then injecting a second gel-forming composition capable of gelling at substantially the same time as the first composition {see column 4, lines 27-46}.

US 5,291,949 DOVAN et al. teaches a method of inhibiting or blocking a caustic flood breakthrough at a production well by injecting lanthanide through the production well to produce a gel upon contact with the caustic flood fluid that will inhibit and block the caustic flood fluid from reaching the production well {see column 10, lines 7-28}.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela M. DiTrani whose telephone number is (571) 272-2182. The examiner can normally be reached on 7:30AM – 5:00PM (EST).

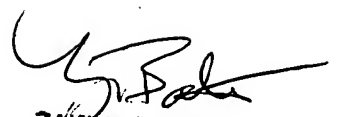
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Glessner can be reached on (571) 272-6843. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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ZAKIYA BATES  
PRIMARY EXAMINER  
TECHNOLOGY CENTER 3600

AD   
10/26/06